SECTION C Descriptions and Specifications

C.1 STATEMENT OF WORK

STATEMENT OF WORK
Engineering Services in Support of
Ocean Work and Cable Systems

1.0 Scope.

1.1 Purpose. The purpose of this statement of work is to describe the contract requirements for engineering services for analysis, model development, concept development, design, prototype fabrication, installation, testing and evaluation to support projects in Ocean Cable Systems and Ocean Work Systems Development. The equipment and techniques developed will be applied to systems for environments ranging from arctic to tropic and at all water depths where construction, installation, maintenance, inspection, repair, and salvage operations may be needed to support NFESC's customers.

The contractor work may include development of concepts for ocean cable systems for various applications: detailed numerical simulation of the performance of such systems in different environments; analysis of the behavior of those systems during handling from various platforms; detailed design of cable systems or components (such as cables, connectors, load handling systems, ocean instrumentation systems, power systems, sea floor earth moving equipment and related equipment); fabrication and installation of prototypes; testing and evaluating of prototypes in the laboratory and in the field, including selection, modifications and use of test platforms and Remotely Operated Vehicles (ROV's); and analysis and reporting of test results. The contract work will also require development of technology, equipment, and techniques for conducting work operations for diver, Remotely Operated Vehicle (ROV), and other related weightless or hostile environments.

Work performed under this contract may include only one or any number of the phases of development. In other words, in support of a particular program the contractor may only perform the concept development, or may only do testing and not evaluation. Programs that involve long term testing may be accomplished under separate orders. One order may install a system, and a different one may recover the system. However, all phases may also be performed under one order to support a program. This flexibility is required to support the phased nature of many systems development programs.

Technical support to accomplish tasks specified in individual delivery orders issued under this contract may be required in the following general areas. This list is not inclusive, but is intended to show the range of capabilities required. The technical tasks and technology areas are as follows:

a. Ocean System Concept Development. This requires capabilities in the areas of computer simulation of cable dynamics, overall system integration, engineering analysis of system combined response to environment (temperature, pressure, corrosion, biological attack, current loading, wave loading etc.), design for high reliability, and special materials and methods required for long life in the ocean. Capabilities are also required in the conceptual development of cable systems, analysis of specific work functions to develop optimal techniques to efficiently perform many different kinds of underwater work.

b. Cable Design, Fabrication and Test. This requires specialized computer capability and field experience in the art of designing cables that can be manufactured, including the combination of electrical mechanical, optical, pneumatic and hydraulic members in the cable. Experience is also required in monitoring the fabrication process to ensure that cables meet design specifications. Capability is required in the areas of electrical, optical, pneumatic, hydraulic and mechanical instrumentation of cable tests. Facilities for laboratory simulation of cable loading from pressure, temperature and tension are required, as is experience in the interpretation of results of such tests. The contractor may also be required to develop feasibility studies and cost estimates for building, installing, and/or maintaining conceptual ocean cable systems.

c. Cable Hardware Design, Fabrication and Test. This includes all types of cable hardware. Some examples are strain reliefs, terminations, connectors (both wet and dry mating), splices and cable breakouts. Experience is required in matching cable hardware to the system performance requirements, design of original hardware using existing technologies, fabrication of prototypes (including both machined and molded parts), laboratory and at-sea testing. Testing may include both the loading on the system when connected, and the handling processes for mating, un-mating, installation and recovery.

d. Power Systems Design, Fabrication and Test. Capability to design and develop power supplies and distribution equipment for cable systems operating at high power and high voltages (typically up to a megawatt at several thousand volts), and utilizing both surface-supplied and subsurface-supplied sources is required. Design, fabrication and testing of deep submergence vehicle battery systems and development of the power source, distribution and other auxiliary systems is often required. Diver safety must be incorporated in many designs. Capability also is required for design and development of low-power systems (a few milliwatts to a few watts) for use in support of undersea sensor systems, diver-held equipment, ROV tools and related items.

e. Fiber Optic Link Design, Fabrication and Test. Fiber optics are becoming increasingly common elements in cable systems. Techniques to select suitable fibers, incorporate them in cable design, fabricate prototype sections and conduct laboratory or at-sea tests are required. This implies instrumentation and methods to measure optical properties at standard wavelengths (0.85. 1.3, 1.5 and 1.55 microns). Experience and test capabilities related to measurement of fiber optic and electro-optic cable survivability in the ocean also are required. Tests include various types of deployment, cable handling, cable winding, pressure testing, abrasion testing, recovery and other similar tests.

f. Cold Region Applications. Although the deep ocean never gets colder than the freezing point of sea water, ocean cable systems and the systems used to install them must operate in all temperatures from the tropics to the polar regions. During handling, installation and (for the surface elements of cable systems) during operation, some parts of the system can see severe cold temperatures. It is necessary to provide special consideration in all phases of system concept development, design, fabrication and test to account for these cold region environment problems. Particular experience is required in the logistics and techniques for field testing cable systems in cold regions.

g. Load Handling System Design, Fabrication and Test. The worst treatment that many cable systems see comes during handling of the cable (and possibly a suspended load) from a work platform at sea. It is necessary to be able to design both the cable and the handling system to be compatible if a system is to be successful. Typical handling system applications include handling of vehicles, instrumentation or sea floor equipment from surface vessels. Special applications also include cable laying from vessels of all sorts. Capabilities are required to fabricate and test actual cable load handling systems for such applications as ocean moorings, salvage, vehicle operations, cable laying and recovery, instrumentation suspension and positioning on the seafloor and related tasks. These tests include at sea testing.

h. Ocean Work Platform Selection and Modification. The selection of the work platform is one of the first and most important parts of any cable system development. Platform costs are often dominant in program costs and platform properties affect all parts of system design. It is necessary to be fully conversant with platforms that are available, to be capable of designing and performing modifications when required and to generally plan and conduct at-sea operation of the platforms.

i. Work Vehicle Selection, Modification and Operation. Cable controlled and other ocean work vehicles are often used in installing, recovering or maintaining ocean cable systems. They are used for inspection, excavation, burial, sample recovery, cable handling/connecting and a variety of supporting tasks. It may be necessary to select the proper vehicle, modify it to sense the needed parameters and provide the proper cable handling tools. It may also be necessary to plan and direct the overall vehicle operations. Particular skills and equipment are required to provide the services of larger deep-ocean work vehicles, as contrasted to the smaller shallow-water vehicles used for inspection only.

j. Ocean System Monitoring. This includes instrumentation and measurement of ocean properties related to cable systems to monitor performance during development testing, long-range telemetry of performance data from remote sites, and close inspection of cable systems in-situ. Site characterization, evaluation and surveys are included. It also implies capability for dissection and post-mortem analysis of cable system components such as connectors, tools, cables, pressure housings and other hardware.

k. Use of Computers for Ocean Systems Monitoring. Monitoring and inspection of ocean properties relevant to cable systems and components generates large volumes of data that must be handled and analyzed by computer. Simulations of cable dynamics, mooring system design and other cable simulations must also be performed in the laboratory and at sea. A full capability to design and implement computer-based support systems is required.

l. Tool systems, including individual tools such as drills, saws, and welders for use by divers or ROV's in construction, maintenance, inspection, repair, salvage, and other applications.

m. Hydraulic and especially seawater/water hydraulic machinery (pumps, motors, gearboxes, actuators, fluid controls, filtration, pulsation dampers).

n. Undersea inspection or testing using visual, ultrasonic, electro-magnetic, or other nondestructive techniques.

o. Precision manipulator/robotic arms and associated control systems.

p. Work techniques for optimizing diver, ROV, and equipment performance.

q. Power systems and associated components for submerged and surface use such as electro-hydraulic, pneumatic, electric, and combinations of these.

r. Planning and execution of at sea operations for evaluating undersea equipment, work systems and methods. This will include equipment and logistic support for T&E operations.

s. Underwater work vehicles and other support equipment: lift devices, object locators, navigation systems, mobility aids, support/assist platforms, winches, oil/seawater hydraulic test stands, and ocean instrumentation.

t. Program documentation (operation and maintenance manuals, test reports, specifications, Integrated Logistics Support (ILS) plans, test and evaluation plans, training plans and drawings). Systems integration (seawater hydraulic tool systems, underwater work systems, work package positioning and control systems. These items will be specified in individual delivery orders.

2.0 Background.

The Naval Facilities Engineering Service Center (NFESC) is the Navy's activity with responsibility for research and development related to the siting, concept development, design, installation, operation and maintenance of fixed ocean facilities. The Ocean Facilities Department conducts research, development, fabrication, test and evaluation in the specific areas of construction of fixed structures on the sea floor; underwater excavating, drilling, tunneling, and earth moving; equipment and tools for underwater construction; ocean current measurement systems and other engineering sensors; underwater power sources; electrical power distribution equipment and transmission systems; surface and underwater load handling systems and Arctic ocean engineering. NFESC may also be tasked with applying these technologies to assist other government agencies in ocean platform support, remotely operated vehicle (ROV) operations and search, location, and recovery operations for a wide spectrum of purposes. Many of the systems take the form of suspended cable systems or utilize cables as part of the construction system. To increase the effectiveness of underwater work conducted by the U.S. military, the NFESC is actively engaged in an integrated program of technology and equipment development with a central goal – to provide improved tools and work techniques for use in the ocean.

Among recent innovative improvements to underwater tools has been the development of seawater hydraulics technology. Successful development of a production vane motor and field use of the prototype seawater hydraulic tools has demonstrated the benefits of using seawater as the working fluid for underwater tools. As a result, seawater hydraulic work systems are now being developed. Development of seawater hydraulic tools, support equipment and other high technology tools and techniques will greatly increase the effectiveness of the Navy diver in performing underwater work and accomplishing the Navy mission.

3.0 Requirements.

3.1 General Requirements.

3.1.1 The contractor shall:

a. Provide specified services of the type identified in paragraph 3.2 of this Statement of Work, which meet the requirements of this contract and the individual delivery orders issued thereunder.

b. Travel to various Government activities and other locations as required by individual delivery orders to perform the program management, analysis, development and testing. A significant amount of the travel will be to NFESC. There may also be some travel to selected test sites. Such travel requirements may include trips to field sites and sea tests. At-sea travel will include travel aboard Government, Government contracted or contractor-supplied vessels. Any contractor-supplied craft will only be incidental to other contractor responsibilities, and will be of such small size, special purpose or short duration as to fall outside the responsibility area of other government contracting activities (such as MSC). Program reviews may be held in Washington D.C., or other locations two or three times a year. The contractor may be required to attend these reviews, as stipulated in individual delivery orders. Three sea cruises and one Arctic deployment for testing have been typical for each year, along with a variety of other local sea operations. This shall not preclude, however, operations of greater duration or frequency in other areas both domestic and foreign.

c. Assume custody of Government Furnished Information / Property (GFI / GFP) and provide for proper use, storage, and maintenance. Return GFI / GFP as scheduled, and identify damaged or missing items.

d. As required by individual delivery orders, provide facilities (such as meeting space, inspection areas, etc.), equipment, in-process documents and personnel for in-process reviews at the contractor's facility and at NFESC.

e. Provide progress reports and other data of a nature and frequency as specified by the attached DD1423 CDRL and individual delivery orders.

f. Review, evaluate, analyze, revise, and update the applicable documents described in each individual delivery order in the manner prescribed in that order.

g. Visit Government and contractor facilities for data gathering, briefing and clarification purposes. The NFESC primary point of contact for technical matters shall be the Contracting Officer's Representative (COR) identified in the basic contract.

h. Provide a Quality Assurance Master Plan describing the plans and procedures that will be used to implement quality assurance.

3.1.2 Government will:

a. Provide definitive requirements for effort as specified by individual delivery orders.

b. Provide technical clarification of requirements within the formalized work and funding constraints of the delivery order.

c. Identify, provide, and monitor contractor control of Government Furnished Property and Information

(GFP/GFI), including computer programs and appropriate users manuals.

d. Provide access to NFESC and other Government facilities, personnel, documents, and publications considered necessary to the contractor's effort under the contract.

e. Schedule and conduct in-process reviews either at the contractor's facility or at NFESC, as necessary to provide comments and recommendations for the contractor's use in finalizing the services ordered.

3.1.3 Schedule. A delivery schedule for each service ordered shall be defined in each individual delivery order.

3.2 Specific Services Required. The following is a representative list (not necessarily complete) of anticipated and planned representative task requirements that may be directed by written delivery orders to be issued to the contractor.

3.2.1 Dynamic Analysis of Ocean Systems. Conduct dynamic analysis simulations of specific surface platform, suspended load configurations to evaluate dynamic response in seaways or in response to subsurface disturbances (current etc.) and to identify regions of potential snap-loading behavior. The simulations shall be made using validated dynamic simulation computer programs.

The contractor may be required to provide computerized frequency and time domain solutions to cable systems behavior. Computer programs may also be required to provide descriptions of the static and dynamic behavior of both simple and redundant ocean cable systems loaded by point loads, moving boundaries (including free-fall bodies), currents and pay-out/reel-in. Analysis options include definition of static configurations under gravity, point and current loadings; the dynamic response of the system in the time domain; and natural frequencies and mode shapes of any equilibrium configuration.

Conduct parametric analyses of hydrodynamic and mechanical systems to optimize system performance. Compare model analysis results with empirical test data and refine the model as necessary to achieve performance requirement goals specified in the delivery order.

The simulations may result in written reports presenting the findings, identifying regions of unacceptable performance and specifying bounds of operating conditions. The reports shall include all of the results of calculations, data and other supportive information leading to conclusions presented.

Examples of possible tasks in this area include analysis of cable behavior for cable reliability and survivability under various cable configurations. Analysis of the installation behavior of cable and sensor nodes for fixed distributed cable systems, analysis of strumming behavior of suspended sea floor cables, analysis of behavior of fiber optic cables and tethers in currents and various sea states, analysis and design of rugged link fiber optic moorings for deployed sensor systems, analysis of load-handling requirements for deployment of sea water battery mockups, analysis of suspended acoustic source cable dynamics, analysis of deformation of suspended acoustic structures in near-surface currents, and analysis of deep ocean moored structure responses. Also included are analysis of complex fluid power components such as impact mechanisms for rock drills.

3.2.2 Simulation Model Development. Modify existing models or develop new ones for simulating the dynamic response of ocean engineering construction systems. The contractor may be required to develop new options for existing simulation models to analyze the dynamic response of systems in situations not handled by existing models. In other cases, the contractor may be required to develop a new simulation model. In all of these cases, the contractor will be required: (1) to thoroughly verify that any program modifications do not adversely affect any existing capabilities and (2) to validate modifications or new programs by comparing calculated results to experimental data. In addition, the contractor will be required to thoroughly document any program modifications or new programs by revision of the existing manual for the program or by preparation of a new manual.

Examples of tasks in this area include development of models for peel-point tension limited cable deployments, modified strumming models for damped end points, cable slack predictions, modeling of the response of cable supported structures for acoustic source arrays or other instrumentation, and development of a hydro-dynamic model of a hydraulic impact mechanism to study mechanism behavior.

3.2.3 Ocean System Concept Development. Develop concepts for ocean work/cable systems, including, but not limited to, suspended cable structures, work vehicles, tools, power systems and associated instrumentation systems. The concepts shall combine the needed elements of ocean engineering design to provide suitable mechanical, electrical, hydraulic, pneumatic and optical support for payloads such as acoustic sources and sensors, buoys, moorings, sea floor facilities, ocean properties instrumentation or communications systems. Concepts shall include material compatibility considerations to provide long in-situ life, must come equipped with methods for installation and operation or maintenance, and in general must reflect the best state-of-the-art ocean engineering practice. Where new technology is required, it shall be identified and estimates of the required development shall be provided. Concepts shall include provision for operating in polar environments when required. As specified in applicable delivery orders, conduct analysis of specific work functions to develop optimal techniques for efficiently performing the work. The effort may include defining, conducting, and analyzing tests to evaluate mechanical processes for performing the underwater task. The results shall provide for selection of appropriate work process and define the critical operational parameters that affect system optimization.

Examples of tasks in this area include development of concepts for cable system terminations, new methods of shore cable protection, improved concepts for handling cables by divers, handling and deployment concepts for very small fiber optic cables, test methods for fiber optic cables, special electric field detectors for divers, maintenance concepts for sea floor cables that cannot be brought to the surface, vehicle tools for underwater connector operations, 10KW and 25KW ground fault systems, and related tasks. These tasks would support the next generation light-weight deep ocean distributed systems, shallow water distributed systems, and other cable development programs. Also included are concepts for techniques to deploy tool systems either by a diver or from a ROV.

3.2.4 Cable Design, Fabrication, Installation and Test. Detailed cable designs shall be prepared to meet various electrical, mechanical, and optical system performance specifications. The designs shall be compatible with industrial manufacturing capabilities and shall be compatible with cable hardware designs (terminations, splicing, connectors, breakouts etc.). The contractor shall then provide support in monitoring the actual cable fabrication process to ensure a quality product. Test plans shall be prepared for cable testing from basic laboratory tests of continuity through environmental tests (pressure, temperature in-situ etc.). Cable testing is to be conducted as required both to verify cable capabilities and to ensure that the cable functions as part of the overall system. Test reports shall be provided to summarize and interpret the results of these tests as they impact the system performance.

Examples of tasks in this area include the design, fabrication and testing of a rugged link fiber optic mooring cable for deep ocean use design, procurement and test of cables for ocean acoustic sensor structures; and design of electrical power umbilicals for large scale acoustic arrays. These tests include both laboratory and at-sea testing.

3.2.5 Cable Hardware Design, Fabrication and Test. Special designs shall be developed as required for individual system applications. Elements to be considered shall include, but are not limited to, terminations stops, connectors, penetrators, splices, breakouts, strain reliefs and other cable fittings. Commercial hardware may be used or adapted as required, or entire new designs may be needed. Hardware may be purely mechanical, electro-mechanical, electro-optical or other combinations including hydraulics/pneumatics. Connectors may be either wet-mateable or dry--mateable, depending on the application. Units shall be designed, fabricated and tested, typically in small quantities. Full ocean pressure and temperature ranges are required in sea water. Fabrication may require both machined and molded parts.

Examples of such tasks include development of mockup fiber optic wet connectors for demonstrations, selection and installation of connectors for ground-fault systems, development of connector wet-mating test fixtures, development of fiber optic penetrators, design and fabrication of wet connectors, termination of cable samples for fiber optic cable testing, design of swivels and end fittings for the rugged link open ocean mooring, development of swivels or end fittings for the fiber optic tether on-deck handling system, and special termination of acoustic array umbilical cables. These systems may be tested in the laboratory as well as at-sea.

3.2.6 Cable Installation and Repair. Engineering support for the development of cable installation and repair techniques shall be provided. This task shall include beach/shore landing applications as well as all depths of ocean cable applications. In addition, development efforts may involve unique or novel techniques involving, tow bodies, excavation, drilling, plowing of cables and/or cable hardware.

Examples of tasks in this area include development of saws for making slots in shoreline rocks for laying cable into, developing specialized drilling equipment for make cable conduits in shorelines, developing lightweight sleds for burial or extraction of cables from the seafloor, and performing tests to establish the survivability of different cables subjected to various environmental forces.

3.2.7 Undersea Power System Design. Sub-surface power sources such as batteries, fuel-cells and other sources shall be evaluated and selected for various applications. The sources shall be modified, as required and packaged for ocean use. Suitable power distribution systems shall be designed, fabricated and tested in the laboratory or at sea, as a subsystem to the overall cable system. Methods for pressure compensation or suitable housings shall be included and interface shall be provided with external harnessing systems as required.

Examples of such tasks include at-sea testing of sea water batteries for the sea floor cable systems, and selection of power sources for deep ocean instrumentation Systems in support of the next generation light-weight deep ocean distributed systems and other programs, shallow water distributed systems, and power delivery systems for acoustic arrays.

3.2.8 Fiber Optic Link Design Fabrication Test. Fiber optic links for use in ocean cable systems shall be designed, fabricated and tested. Links include command and control data links in umbilical cables for vehicles, sea floor cable communication links for sea floor sensor systems, fiber optic sensor systems such as strain indicators for mooring lines, and similar applications. These links shall include selection of fibers, sources and detectors. They may also include the required connectors and splices to assemble the system. Testing may include both laboratory bench tests and also environmental simulations such as pressure and temperature. Testing instruments and methods shall be to standards set either by the National Bureau of Standards or other project standards. Test capability is required for standard operating wavelengths of 0.85, 1.3, 1.5 and 1.55 microns, both single mode and multi-mode.

Examples of such tasks include test of fiber optic wet connectors; design, assembly and test of a fiber optic mooring leg for tactical terminations; design of system mockups for demonstrations; design of vehicle umbilicals with fiber optic link; and design of optical links for diver inspection systems.

3.2.9 Adaptation for Cold Regions. As specified under applicable delivery orders equipment and techniques developed will be designed to be adaptable for use in polar regions. In these applications, systems must be capable of operation in all temperatures from the tropics to the polar regions. Some parts can see severe cold temperatures including thermal stresses resulting from immersion in seawater after exposure to cold ambient air temperatures to -100F. Areas of special concern include system design to be compatible with polar logistics, system response to thermal shock, system response to ice, human engineering of components for cold-region operation, resistance to animal attack, power system operation at low temperatures and related technical problems. The contractor shall conduct selected low-temperature tests of system components as required, both in the laboratory and in the field. The contractor shall design, fabricate and test any special systems or components or modifications needed to adapt equipment for cold weather use.

Examples of such adaptations include modification of acoustic sensors to tolerate extreme cold, selection of power sources that operate at low temperatures, design of deck handling systems to operate when iced. Any ocean cable system application within the scope of the NFESC mission may be required to operate in polar regions. These systems may need to be tested in laboratory and at-sea conditions. Those tests involve testing at very remote, polar sites. Such testing is usually conducted during one intense period each spring to minimize logistics costs.

3.2.10 Load Handling System Design, Fabrication, Installation, and Test. The contractor shall design, fabricate and test prototype load handling systems for a variety of applications. These systems shall be fully analyzed for static and dynamic behavior from the selected platforms in the design sea conditions. Both linear and non-linear analysis shall be required to ensure system stability. System designs shall accommodate both the launch/recovery of discrete loads (such as vehicles, instruments, anchors, acoustic sources, etc.) and the continuous pay-out/reel-in of cables in the water column. The testing may include at-sea and dockside operations for each system. Tests at sea may average two to three major tests per year, with duration of approximately one to two weeks each. There may also be several shorter near-shore tests for each system. These tasks would be required to support the Navy's acoustic and ocean cable research and development programs.

Examples may include the track handling system for multi-ton acoustic sources, motion-compensation systems for salvage such as the ram tensioner or linked spar systems, cable laying equipment for conventional coaxial range cables, vehicle handling systems for manned or unmanned vehicles, special cable handling equipment for installation of small fiber optic cables, or other special-purpose handling systems

3.2.11 Ocean Work Platform Modification and Sea Test Support. The contractor shall provide detailed designs for any required modifications to the selected platform related to a cable system, including deck layouts for all equipment. The contractor may then be required to perform or direct the modifications of the platform and installation of equipment before sea operations. The contractor shall also provide technical consultation and assistance during at-sea operations and shall perform or direct the removal and refurbishment of equipment after operations. Refurbishment shall include equipment field maintenance, preventative maintenance, provisioning of consumed direct replacement components and consumables.

Examples include adaptation of ships of opportunity or any NFESC offshore research craft for conducting at-sea cable-handling operations, site characterization and/or evaluation of ocean property surveys, work package placement and recovery. Work shall also include analyzing survey results to produce navigation and bathymetry plots. For some operations, it may be necessary for the contractor to actually provide surface support craft in support of at-sea testing and design validation. These craft are incidental to the primary at-sea testing function and used in conjunction with other contractor assigned tasks.

3.2.12 Ocean Platform Selection. It may be necessary for the contractor to provide surface support craft for at-sea tests. Such craft will be selected by the contractor based on suitability for the operation, safety, and specific requirements of the test. The contractor shall analyze the capabilities of various work platforms for given applications and recommend the platform to be used. Analysis shall include prediction of platform motions in seaways, deck loading arrangements, power supplies and interfaces. The analysis may also include cost estimates, predictions of platform availability, certification requirements, manning requirements and related matters. The contractor shall consider both commercial and government platforms in the selection process, including conventional offshore work boats, commercial fishing craft, drilling vessels, Naval combatants, NFESC work vessels, or other special government vessels. Selection shall also consider the site of the work; although most of the work to be conducted is in the local area, NFESC does provide support to projects world-wide.

Examples of tasks include selection of platforms for at-sea vehicle operations for various projects, selection of platforms for deployment of large scale acoustic arrays, selection of platforms for sea water battery testing, and similar ocean cable operations.

3.2.13 Marine Power System Design. Power sources suitable for use on surface work platforms or for shore-powered systems at remote sites shall be evaluated, selected and modified as required to supply electrical, optical or hydraulic power to ocean cable systems. Typical Systems include ship power distribution systems, work vehicles, diver tools, acoustic sensors, instrumentation and communication systems. Power levels range from a few milliwatts to several megawatts, depending on the application. Power distribution systems capable of penetrating the air-sea interface and transmitting power over distances ranging from a few feet for suspended systems to several miles for sea floor cable systems shall be designed as required. Prototype systems may be fabricated and tested in the laboratory and at sea. Power sources shall be compatible with the marine environment. Safety features shall be included to provide safety for personnel on deck, divers, and the equipment, as required. These safety features may include special sensors to detect fields, high-speed shut-down equipment or other specialized equipment, as required.

Examples include power system design for large acoustic arrays that require up to 2 Mw, in-buoy power system for a radio-frequency transmitter for one year, deck power system for fiber optic tether handling system, power system to support instrumentation van at a remote marine site for one year and related tasks. The contractor may be required to design, modify, provide, fabricate, install and test these power systems at sea.

3.2.14 Work Vehicle Selection, Modification and Operation. Under applicable delivery orders the contractor shall analyze requirements, then select, modify as appropriate and operate underwater construction assistance vehicles for designated applications. The contractor shall analyze the capabilities of candidate underwater work vehicles for designated applications, including overall operating envelope (depth, endurance, current, weather), special support requirements (platform, handling etc.), sensor capabilities, manipulator or work system capabilities and special features (cable tracking, bottom operations etc.). Both manned and unmanned, commercial and government vehicles shall be considered. System operating reliability and costs shall be estimated including required support services. A recommendation for a system shall be prepared, including any required modifications.

The contractor shall provide detailed design and fabrication of required modifications, including special construction tools and ancillary equipment. The contractor may then be required to fabricate and to conduct test and evaluation of these modifications in both laboratory and at-sea conditions. For these operations the contractor shall provide support to plan and direct the operations at-sea and to document the results of these operations.

Examples include selection of the vehicle for sea floor work demonstrations, selection of vehicles for support of sea water battery tests, selection of vehicles for support of diver operations and inspection, vehicle adaptations for sea floor work function demonstration, tools for connector mating, adapting cable-tracking instruments to vehicles and similar tasks. The contractor may be called on to provide the complete vehicle services for at-sea inspection, recovery and work operations, including vehicle selection, modification and operation as required. These vehicle services would be provided incidental to primary tasks of at-sea testing, design validation or data acquisition.

3.2.15 Ocean System Monitoring. The contractor shall design, fabricate or assemble instrumentation systems capable of monitoring and recording the performance of deck handling equipment, cable structures, ocean work platforms, vehicles, tools, power systems or other ocean construction systems. This may include computer-controlled data acquisition, telemetry of data from remote sites, processing of data in-situ (underwater or on deck), or manned data acquisition. A wide variety of sensors may be required, including accelerometers, strain gages, line tension indicators, pressure gages, temperature sensors, hydrophones, salinity, and related items. Measurements of the operating environment may also be required, including current, sea state, wind, salinity, marine fouling, sea water chemistry, and ocean acoustic data. These monitoring systems shall be integrated with the overall system design to ensure that both the operational data required for installation of the system is provided and also the data needed for analysis of likely failure modes. It is expected that these instrumentation systems will require extensive use of computers or microprocessor-aided sensors.

Examples include monitoring of tensions in fiber optic tethers, instrumentation of ship motion and sea state during at-sea tests, monitoring mooring line and umbilical tension and ship location for advanced mooring systems. Recording data from diver inspection tasks, video monitoring of sea floor work demonstrations, current measurements to depths of 10,000 feet during at-sea operations, site characterization and analysis of sea-water properties, sea-floor properties and related tasks. The contractor may be required to assemble instrumentation packages for test, including provision of needed basic components and modifications as required.

3.2.16 Seawater Hydraulic Systems Development. Conduct engineering analysis of existing commercial hydraulic components suitable for use on seawater hydraulic work systems. Modify components and/or develop new components as required to satisfy design criteria. Evaluate system performance under both laboratory and operational at-sea conditions.

Examples of seawater hydraulic system development include modifications to servo-control valves to achieve reliable operation; extended operational tests of seawater hydraulic systems to evaluate long term submersion: and adapting seawater hydraulic components to existing oil hydraulic systems.

3.2.17 Motor/Pump Design/Fabrication/Test. As specified in applicable delivery orders, conduct engineering design, fabrication and test of seawater/water hydraulic motors and pumps with specific output requirements and physical characteristics matched to the requirements of the overall system and individual component requirements. Evaluation of component performance will include validation of the

design criteria. Preproduction and prototype models will be fabricated based on fabrication drawings generated by the contractor. Also included will be test evaluation, development reports and integration of components into the underwater work system.

Examples of seawater motor and pump development include laboratory testing to determine individual component wear rates and failure rates; evaluation of latest commercial water hydraulic pumps and motors; and design of variable displacement pumps to match work system demand requirements.

3.2.18 Underwater Work System Development. Design, fabricate, and test prototype tool/work systems including power sources, controls, and tools for conducting specified work functions in a weightless environment, given operational and work function requirements and desired physical characteristics. All tool/work system components exposed to seawater must be designed to be compatible with the seawater environment including such considerations as corrosion, contamination, biofouling, and hydrostatic forces as specified in the delivery order. Tools shall be designed to perform the specific work function and to be compatible with any special operator requirements. Human/machine factors, safety and reliability will be integrated into the tool design. Test and evaluation plans, operation and maintenance manuals, specifications and fabrication drawings will be prepared for specified tools/work system.

Examples of underwater tool/work systems include design of a suite of diver tools using a seawater hydraulic motor as the driving force; development or adaptation of energy sources for powering individual components, or sub-systems of the work systems; and designing a seawater hydraulic system for ROV operation.

3.2.19 Underwater Inspections and Mappings. Design, fabricate, test and evaluate equipment for performing underwater inspections and mapping. Conceive new methods and equipment for non-destructive inspection of undersea objects.

An example of this work might be the development of a non-destructive tool to measure interior deterioration of a timber pile that can be performed by a diver.

4.0 Facilities. Work under this contract is to be performed in contractor/subcontractor facilities which have at least a TOP SECRET facility clearance. The nature of the tasking under this contract will require rapid response and repeated visits to NFESC. Due to the necessity for direct technical liaison and the requirement to limit travel by both the contractor and NFESC personnel, contractor facilities capable of planning and performing technical functions shall be located within 80 miles of NFESC (Port Hueneme, CA.). Government equipment and facilities may be available for performance of portions of the anticipated work. When use of Government facilities and/or equipment is required or permitted, their use will be specified in the attendant delivery order.

Facilities for engineering, design, graphics capabilities, precision fabrication (for example machining to tolerances of $\pm$ 0.0001 inches) testing, and inspection are required. Work done under this contract will require the availability of computers capable of running the cable analysis programs. The facilities should. for example, include the equipment, procedures, quality assurance procedures, and personnel for fabricating and testing components for 3000 psi hydraulic systems.

C. 2 PERSONNEL REQUIREMENTS

1.0 Personnel Requirements.

1.1 General. Proposed personnel must possess comprehensive knowledge of ocean engineering disciplines, computer simulation of dynamic system response, ocean engineering instrumentation, detailed design, environmental testing and at-sea operations. They must present demonstrated ability to provide complete, definitive dynamic analyses, system evaluations and reviews in these areas, and to summarize and document findings in specified report form. They must also show capability to build and test ocean engineering prototypes.

1.2 Resumes. Resumes shall be provided that describe the personnel proposed to be assigned to provide the engineering services required in the Statement of Work. Each resume submitted should describe educational and experience background in sufficient detail to demonstrate experience and capability to satisfy the requirements of Section 2.0. The resumes should be presented in such a fashion that they can be analyzed for acceptability of education/experience in those technical areas set forth in Section 2.0.

1.3 Labor Categories. The following definitions establish the labor categories required as a minimum under this contract. For categories 1.3.2, 1.3.3 and 1.3.4, one person need not meet all the requirements of any category, and one person may meet some of the requirements of more than one category. However, resumes must be submitted for personnel that together meet all requirements of all categories.

Only the key, minimum labor categories are described. The government recognizes that it is cost-effective for the government and essential to the contractor's personnel management to use entry-level or junior personnel for many tasks. Such personnel may be proposed by the contractor for government approval prior to their use, either as part of the basic contract or on a delivery-order basis. The contractor shall explain how the qualifications of the personnel are suited to the government tasks and how the key personnel will ensure that quality control is maintained. Key personnel are annotated with an asterisk (*).

1.3.1 Technical Manager*. The individual must have:

(a) a minimum of a Masters of Science Degree in Civil, Electrical, Mechanical, or Ocean Engineering;

(b) a minimum of fifteen years experience in high technology ocean engineering systems development, five years of which must include R&D project management. Demonstrated knowledge of and experience in computer simulation of the dynamic response of ocean engineering systems and at-sea operations;

(c) a demonstrated capability to organize and direct technical and management programs which include multi-disciplinary tasks and requirements;

(d) experience in working with and an under-standing of Navy R&D programs in ocean engineering;

(e) knowledge of DOD contracting procedures and regulations; and

(f) Professional engineering registration.

1.3.2 Program Manager*. The individual must have:

(a) a minimum of a Bachelor of Science Degree in either Engineering or Science disciplines;

(b) a minimum of five years experience in Program Management and Government Contracting. Demonstrated knowledge of contract administration and experience in multi-project supervision;

(c) recent relevant experience in Ocean Engineering, operations and cable system design/test/evaluation, acquisition management, and specification development;

(d) experience in directing the integration of a program/project team which includes: engineering, purchasing, fabrication, installation, testing, quality assurance, documentation and financial administration supporting multi-year projects.

1.3.3 Senior Systems/Computer Analyst*. The person must have:

(a) a minimum of a Master's Degree in Engineering;

(b) a minimum of ten years experience in the area of dynamic systems modeling, computer applications for dynamic systems analysis, and verification of mathematical models of systems against actual system performance; and

(c) a minimum of five years experience in computer hardware and software development specifically related to ocean engineering systems.

1.3.4 Senior Ocean Engineer*. This individual must have:

(a) a minimum of a Master's Degree in Engineering;

(b) a minimum of ten years practical experience in design and development of advanced equipment and systems for use in the deep ocean, including subsea cable structures, ocean engineering instrumentation, subsea navigation systems, hydrodynamics, and structural analysis;

(c) a minimum of four years experience in design and analysis of at-sea load handling systems, deck winches, deck machinery, and load/motion compensation equipment;

(d) a minimum of four years experience in the adaptation of ocean engineering methods and systems for use in the Arctic environment;

(e) a minimum of four years experience in the systematic application of corrosion control methods to undersea systems;

(f) a minimum of four years experience in the integration of ocean cable systems, including both bottom-laid and suspended or towed systems; and

(g) a minimum of ten years experience in R&D for analysis and design of underwater work systems for remotely operated vehicles.

1.3.5 Senior Civil Engineer. This person must have:

(a) a minimum of a Master's Degree in Engineering; and

(b) a minimum of ten years practical experience in research, development, design and use of advanced equipment for use in the deep ocean, including anchoring and foundation systems, load handling systems and site surveying and investigation.

1.3.6 Senior Mechanical Engineer. This person must have:

(a) a minimum of a Master's Degree in Engineering;
(b) a minimum of ten years practical experience in research, development, design and use of advanced mechanical equipment for use in the deep ocean, including pressure housings, cables, cable hardware, specialized ocean platforms and similar equipment, hydraulic systems, ballast controls, control systems, heat transfer/heat sinking, and corrosion control methods for ocean structures;
(c) a minimum of ten years practical experience in the design of hydraulic system components, particularly pumps and motors, and to conduct hydraulic systems analysis using Dynamic Analysis and Design System (DADS) software or equivalent; and
(d) a minimum of four years experience in development of ocean platforms such as buoys, modified vessels, towed bodies, submersibles, remotely-operated vehicles and similar devices.

1.3.7 Senior Electrical Engineer*. The individual must have:
(a) a minimum of a Master's Degree in Engineering;
(b) a minimum of ten years experience in design and development of advanced equipment for use in the deep ocean, including ocean engineering instrumentation, undersea electro-acoustic systems, and power generation/transmission/distribution equipment;
(c) a minimum of six years experience in telemetry and controls, supervisory and automatic control systems, microprocessors, sensors, displays, and systems for processing acoustic surveillance array data; and
(d) a minimum of four years experience in underwater electric field detection and measurement, safety and related equipment.

1.3.8 Ocean Engineer. This individual must have:
(a) a minimum of a Bachelor's Degree in Engineering;
(b) a minimum of four years practical experience in design and development of advanced equipment and systems for use in the deep ocean, including subsea cable structures, ocean engineering instrumentation, subsea navigation systems, hydrodynamics, and structural analysis;
(c) a minimum of three years experience in design and analysis of at-sea load handling systems, deck winches, deck machinery, and load/motion compensation equipment;
(d) a minimum of three years experience in the adaptation of ocean engineering methods and systems for use in the Arctic environment;
(e) a minimum of three years experience in the systematic application of corrosion control methods to undersea systems;
(f) a minimum of three years experience in the integration of ocean cable systems, including both bottom-laid and suspended or towed systems; and
(g) Five years experience in development of advanced equipment and techniques for use in the ocean. The experience should include the planning and performance of at-sea operations that involve diving and ROV's.

1.3.9 Mechanical Engineer. This person must have:
(a) a minimum of a Bachelor's Degree in Engineering;
(b) a minimum of four years practical experience in research, development, design and use of advanced mechanical equipment for use in the deep ocean, including pressure housings, cables, cable hardware, specialized ocean platforms and similar equipment. Experience is also required in hydraulic systems, ballast controls, control systems, heat transfer/heat sinking, and corrosion control methods for ocean structures; and
(c) a minimum of three years experience in development of ocean platforms such as buoys, modified vessels, towed bodies, submersibles, remotely-operated vehicles and similar devices.

1.3.10 Electrical Engineer. The individual must have:
(a) a minimum of a Bachelors Degree in Engineering;
(b) a minimum of five years experience in design, development, and trouble shooting of advanced electrical/electronic equipment for use in the deep ocean, including ocean engineering instrumentation, undersea electroacoustic systems, and power generation/transmission/distribution equipment; and
(c) a minimum of four years experience in telemetry and controls, supervisory and automatic control systems, microprocessors, sensors, displays, and systems for processing data such as acoustic surveillance array.

1.3.11 Associate Engineer. The individual must have:

(a) a minimum of a Bachelors Degree in Engineering.

1.3.12 Naval Architect. The individual must have:
(a) a minimum of a Bachelors Degree in Engineering;
(b) a minimum of four years experience in the development of structural modifications to ocean-going vessels for the support of research tasks, including structural analysis, design, and supervision of modifications;
(c) a minimum of four years experience with ABS, U.S. Coast Guard and other appropriate certification regulations for ocean-going vessels, particularly for offshore work vessels and specialized platforms; and
(d) a minimum of four years experience in the comparison and selection of ocean-going work platforms, including analysis of vessel performance, crew performance/requirements, sea-keeping, stability, speed, fuel consumption, safety and costs.

1.3.13 Senior Engineering Technician. The individual must have:
(a) a minimum of eight years experience or combination of technical school plus work experience totaling eight years in a mechanical specialty with some electronics experience. He should be experienced with all metal and wood working equipment, welding both arc and heliarc and mechanical and hydraulic systems such as winches and other deck equipment and be capable of independent troubleshooting;
(b) a minimum of four years experience in fabrication and assembly of towed system components and must understand theoretical as well as practical operation; and
(c) a minimum of four years experience working independently and directing other technicians.

1.3.14 Technologist. The individual must have:
(a) Technical Specialist, non-degreed (or non-technical degree);
(b) a minimum of fifteen years experience in Ocean Engineering or Marine Engineering or Operations or Navy R&D programs
(c) demonstrated capability to organize and direct technical and project management projects which include multi-discipline tasks and requirements.

1.3.15 Senior Engineering Draftsman. The individual must have:
(a) a minimum of eight years experience or combination of technical school plus work experience totaling eight years in engineering drafting; and
(b) a minimum of four years experience in drafting of ocean related equipment. Must be able to translate specifications, informal sketches and verbal descriptions of mechanical and structural equipment into formal detailed drawings suitable for use in procurement of material and fabrication of hardware.

1.3.16 Drafter. The individual must have:
(a) a minimum of six years experience or a combination of technical school and experience totaling four years in engineering drafting; and
(b) capability to produce shop drawings suitable for prototype fabrication.

1.3.17 Senior Technical Writer. The individual must have:
(a) a minimum of a degree in a scientific discipline or equivalent years military or on-the-job experience;
(b) ability, under general supervision, to prepare technical manuals or reports on complex systems and research projects from raw engineering data; and
(c) ability to schedule work effort through illustration, composition, and printing.

1.3.18 Security Manager. The individual must have:
(a) ability to obtain Secret-Bi clearance;
(b) a minimum of one year of security experience;
(c) Supervises, coordinates, and directs the handling and storage of classified material and physical security;
(d) Oversees the procedures, controls and reports for classified material and classified data as well as classified operations;
(e) Checks classified storage facilities and performs inventories;

(f) Responsible for communications security, operations security, and the handling of classified data and physical security of spaces;

(g) Responsible for training personnel.

1.3.19 Security Administrator. The individual must have:

(a) Responsible for the general administrative support for the Security Manager;

(b) Duties include administration and management support, security clearance record maintenance, badge and pass, and security correspondence;

(c) Prepares security reports based on input from project and program personnel for Security Manager review;

(d) Assists employees in filing security related paperwork.

1.3.20 Publication Coordinator. The individual must have:

(a) a minimum of a high school education plus a high degree of typing skills and ability to coordinate assembly of large number of documents within the same time frame;

(b) ability, under general supervision, to type and organize rough manuscript into final technical manuals, reports, or proposal format; and

(c) ability to maintain, controls, and files on all documents.

1.3.21 Senior Program Administrator. The individual must have:

(a) Duties include administration and management support (tracking schedule and funding) support to projects

(b) Prepares funding/schedule data for Government reporting requiremnents.

1.3.22 Project Coordinator. The individual must have:

(a) a minimum of a Bachelor's Degree or equivalent training in business administration and project management;

(b) a minimum of three years experience in assisting technical managers in support of government research and development programs; and

(c) a minimum of two years experience in use of project management software, preparation of program plans, schedule monitoring, cost accounting and preparation of program status reports.

1.3.23 Senior Machinist/Senior Welder. The individual must have:

(a) a minimum experience level of eight years as a machinist/welder in commercial industry or government;

(b) must be familiar with government level 2 and level 3 drawing packages as well as knowledge of good commercial practice in machine/welding;

(c) experience in directing shop personnel as well as quality assurance as it applies to machine/welding fabrication.

1.3.24 Machinist/Welder. The individual must have:

(a) a minimum experience level of four years as a machinist/welder in commercial industry or government;

(b) must be familiar with government level 2 and level 3 drawing packages as well as knowledge of good commercial practice in machine/welding.

1.4 Substitution of Qualifications:

1.4.1 Advanced degrees (Doctorates or Masters) may be substituted for experience on the following basis:

a. Doctorate: four years experience

b. Masters: two years experience.

1.4.2 Experience above and beyond the minimums stated may be substituted for advanced degrees on the following basis:

a. six years experience: Doctorate

b. four years experience: Masters

There is no equivalent experience conversion factor for the Bachelors degree.

1.4.3 Substitution must be in a like or directly related discipline. An advanced degree or extra experience in Humanities will not equate to an engineering discipline.

1.4.4 All requests for substitution must provide a detailed explanation of the circumstances necessitating the proposed substitution, a complete resume for the proposed substitute, and any other information requested by the Contracting Officer needed to approve or disapprove the proposed substitution. All proposed substitutes must have qualifications that are equal to or higher than the qualifications of the person to be replaced. The Contracting Officer, or his authorized representative, and the technical requiring code will evaluate such requests and promptly notify the offeror of his approval or disapproval thereof.

# CONTRACT DATA REQUIREMENTS LIST

| | | |
|---|---|---|
| A. Contract Line Item No. | B. Exhibit | C. Category<br>TDP: TM: OTHER:RPTS/SPECS |
| D. System/Item<br>OCEAN CABLE SYSTEMS | | |
| E. Contract/PR No.<br>N47408-01-D-8202 | | F. Contractor<br>SANTA BARBARA APPLIED RESEARCH, INC. |

| | | | |
|---|---|---|---|
| 1. Data Item #<br>A001 | 2. Title of Data Item<br>PROGRESS & STATUS REPORT | | 3. Subtitle |
| 4. Authority (Data Acq.Doc. No.)<br>CONTRACTOR FORMAT | | 5. Contract Ref.<br>CLAUSE G.4 OF SECTION G | 6. Requiring Office<br>NFESC/52/THOMSON |
| 7. DD 250 Req<br>LT | 8. AAP Code<br>AN | 9. Dist. Statement Reqd | 10. Frequency<br>MONTHLY |
| 11. As of Date<br>MONTH-END | 12. Date of 1st Sub<br>10TH OF THE MONTH | 13. Date of Subsequent Submission<br>MONTHLY | |

| 14. Distribution a. Addressee | b. Copies Draft | Final Req | Final Repr |
|---|---|---|---|
| Deliverable:<br>NAVAL FACILITIES ENGINEERING SERVICE CENTER | 0 | 1 | 0 |
| COPY TO:<br>NAVAL FACILITIES ENGINEERING COMMAND CONTRACTS OFFICE, NF20, BLDG. 41,<br>NAVFACENGCOMDET-NFI<br>ATTN: CAROL A. BEAN<br>3502 GOODSPEED STREET, SUITE 2<br>PORT HUENEME, CA 93043-4306 | 0 | 1 | 0 |
| 15. Totals | | 2 | 0 |

16. Remarks

Report, along with copy of voucher, may be submitted electronically to cognizant contract specialist.

| | | | |
|---|---|---|---|
| 1. Data Item #<br>NOT USED | 2. Title of Data Item | | |
| 4. Authority (Data Acq. Doc. No.) | | 5. Contract Ref. | 6. Requiring Office |
| 7. DD 250 Req | 8. AAP Code | 9. Dist. Statement Reqd | 10. Frequency |
| 11. As of Date | 12. Date of 1st Sub | 13. Date of Subsequent Submission | |

| 14. Distribution a. Addressee | b. Copies Draft | Final Req | Final Repr |
|---|---|---|---|
| Deliverable: | | | |
| | | | |
| 15. Totals | | | |

16. Remarks

| G. Prepared by | H. Date | I. Approved By | J. Date |
|---|---|---|---|
| HUGH THOMSON | 10-18-00 | Hugh Thomson | 10-18-00 |

DD FORM 1423

SAMPLE

PAGE 1 OF 1 PAGES

Attachment 1

# CONTRACT DATA REQUIREMENTS LIST

A. Contract Line Item No.

B. Exhibit A

C. Category N/A

TDP: TM: OTHER:RPTS/SPECS

D. System/Item

E. Contract/PR No. D.O.#1

F. Contractor

| 1. Data Item # | 2. Title of Data Item | | 3. Subtitle |
|---|---|---|---|
| A001 | Design Drawings | | |
| 4. Authority (Data Acq. Doc. No.) CONTRACTOR FORMAT | | 5. Contract Ref. SOW 4.7 | 6. Requiring Office NFESC/Code ESC53 |
| 7. DD 250 Req DD | 8. APP Code AN | 9. Dist. Statement Reqd N/A | 10. Frequency O TIME |
| 11. As of Date | 12. Date of 1st Sub 45 DAC | 13. Date of Subsequent Submission | |

| 14. Distribution a. Addressee | b. Copies Draft | Final Reg | Final Repr |
|---|---|---|---|
| Deliverable: COMMANDING OFFICER NAVAL FACILITIES ENGINEERING SERVICE CENTER 560 CENTER DRIVE PORT HUENEME, CA 93043-4328 | | 1 | 1 |
| Copy of DD250: NAVFACCO, NCBC BLDG. 41, ATTN: CODE 2711 1000 23RD AVE PORT HUENEME, CA 93043-4301 | | 0 | 0 |
| 15. Totals | | 1 | 1 |

16. Remarks

A copy of the transmittal and/or DD250 shall be forwarded to FACCO, Code 271, NCBC Port Hueneme, CA 93043-5003.

| 1. Data Item # | 2. Title of Data Item | | 3. Subtitle |
|---|---|---|---|
| A002 | Model Run Data | | |
| 4. Authority (Data Acq. Doc. No.) CONTRACTOR FORMAT | | 5. Contract Ref. SOW 4.8.1 | 6. Requiring Office NFESC Code C53 |
| 7. DD 250 Req DD | 8. APP Code AN | 9. Dist. Statement Reqd B5 | 10. Frequency As Required |
| 11. As of Date | 12. Date of 1st Sub As Required | 13. Date of Subsequent Submission As Required | |

| 14. Distribution a. Addressee | b. Copies Draft | Final Reg | Final Repr |
|---|---|---|---|
| Deliverable: NAVAL FACILITIES ENGINEERING SERVICE CENTER 560 CENTER DRIVE PORT HUENEME, CA 93043-4328 | | 2 | 1 |
| Copy of DD250: NAVFACCO, NCBC BLDG. 41, ATTN: CODE 2711 1000 23RD AVE PORT HUENEME, CA 93043-4301 | | 0 | 0 |
| 15. Totals | | 2 | 1 |

16. Remarks

A copy of the transmittal and/or DD250 shall be forwarded to FACCO, Code 271, NCBC Port Hueneme, CA 93043-5003.

| G. Prepared by | H. Date | I. Approved By | J. Date |
|---|---|---|---|
| JOHN KUNSEMILLER | 6/7/94 | KAREN MILLER | 6/7/94 |

DD FORM 1423 (NCEL 15 JULY 91) ESC 53



SAMPLE

# CONTRACT DATA REQUIREMENTS LIST

| | | |
|---|---|---|
| A. Contract Line Item No. | B. Exhibit A | C. Category N/A<br>TDP: TM: OTHER:RPTS/SPECS |
| D. System/Item | | |
| E. Contract/PR No. D.O.#1 | | F. Contractor |

| | | | |
|---|---|---|---|
| 1. Data Item # A003 | 2. Title of Data Item Analytical Model | | 3. Subtitle Video/Documentation |
| 4. Authority (Data Acq. Doc. No.) CONTRACTOR FORMAT | | 5. Contract Ref. SOW 4.9 | 6. Requiring Office NFESC/Code ESC53 |
| 7. DD 250 Req DD | 8. AAP Code AN | 9. Dist. Statement Reqd N/A | 10. Frequency 0 TIME |
| 11. As of Date | 12. Date of 1st sub 45 DAC | 13. Date of Subsequent Submission | |

| 14. Distribution a. Addressee | b. Copies Draft | Final Reg | Final Repr |
|---|---|---|---|
| Deliverable:<br>COMMANDING OFFICER<br>NAVAL FACILITIES ENGINEERING SERVICE CENTER<br>560 CENTER DRIVE<br>PORT HUENEME, CA 93043-4328 | | 1 | 1 |
| Copy of DD250:<br>NAVFACCO, NCBC BLDG. 41, ATTN: CODE 2711<br>1000 23RD AVE<br>PORT HUENEME, CA 93043-4301 | | 0 | 0 |
| 15. Totals | | 1 | 1 |

16. Remarks

A copy of the transmittal and/or DD250 shall be forwarded to FACCO, Code 271, NCBC Port Hueneme, CA 93043-5003.

| | | | |
|---|---|---|---|
| 1. Data Item # A004 | 2. Title of Data Item Progress Reports | | 3. Subtitle |
| 4. Authority (Data Acq. Doc. No.) CONTRACTOR FORMAT | | 5. Contract Ref. SOW 3.10 | 6. Requiring Office NFESC Code C53 |
| 7. DD 250 Req | 8. AAP Code AN | 9. Dist. Statement Reqd | 10. Frequency MONTHLY |
| 11. As of Date | 12. Date of 1st Sub 15 DAC | 13. Date of Subsequent Submission MONTHLY | |

| 14. Distribution a. Addressee | b. Copies Draft | Final Reg | Final Repr |
|---|---|---|---|
| Deliverable:<br>NAVAL FACILITIES ENGINEERING SERVICE CENTER<br>560 CENTER DRIVE<br>PORT HUENEME, CA 93043-4328 | | 1 | 1 |
| Copy of DD250:<br>NAVFACCO, NCBC BLDG. 41, ATTN: CODE 2711<br>1000 23RD AVE<br>PORT HUENEME, CA 93043-4301 | | 0 | 0 |
| 15. Totals | | 1 | 1 |

16. Remarks

A copy of the transmittal shall be forwarded to FACCO, Code 271, NCBC Port Hueneme, CA 93043-5003.

| | | | |
|---|---|---|---|
| G. Prepared by JOHN KUNSEMILLER | H. Date 6/7/94 | I. Approved By KAREN MILLER | J. Date 6/7/94 |

DD FORM 1423 (NCEL 15 JULY 91) ESC 53



SAMPLE

DI-FNCL-80331 FN [redacted] 9999984 0008572 T [redacted]

# DATA ITEM DESCRIPTION

Form Approved OMB No. 0704-0188

**2. TITLE**

FUNDS AND MAN-HOUR EXPENDITURE REPORT

**1. IDENTIFICATION NUMBER**

DI-FNCL-80331

**3. DESCRIPTION/PURPOSE**

3.1 This report provides Government visibility into contractor expenditures for labor, materials, travel and other contract charges. It tracks these expenditures against baseline values, and provides to-completion estimates.

| 4. APPROVAL DATE (YYMMDD) | 5. OFFICE OF PRIMARY RESPONSIBILITY (OPR) | 6a. DTIC APPLICABLE | 6b. GIDEP APPLICABLE |
|---|---|---|---|
| 870227 | G/T213 | | |

**7. APPLICATION/INTERRELATIONSHIP**

7.1 This DID contains the format and content preparation instructions for the data product generated by the specific and discrete task requirement as delineated in the contract.

7.2 This DID is applicable to time and material, research and development and other contracts where use of Cost Performance Reporting (CPR) or Cost/Schedule Status Reporting (C/SSR) are not appropriate. It is not applicable on fixed-price contracts. It is acquired on a periodic basis.

(Continued on Page 2)

| 8. APPROVAL LIMITATION | 9a. APPLICABLE FORMS | 9b. AMSC NUMBER |
|---|---|---|
| | | G4079 |

**10. PREPARATION INSTRUCTIONS**

10.1 General. The Funds and Man-Hour Expenditure Report shall contain the following data:

a. A tabular listing of funding and man-hour expenditures inclusive of the reporting period compared to original baseline values, including to-completion estimates.

b. A graphical plot of planned versus actual funding expenditures.

c. A graphical plot of planned and actual percentage of work completed.

10.2 Scope. Each task, job-order, sub-task, or unit of work will be separately addressed. If schedule or milestone reporting is also a reporting requirement under the contract, the breakdown of work task elements should be consistent with that reporting.

10.3 Format and content. The report shall contain the following:

10.3.1 Funds and man-hour expenditure summary. This chart shall contain the following data elements (See Figure 1):

10.3.1.1 Original negotiated contract. A summary of all cost elements associated with the original negotiated contract. This is defined as the contractor's original cost proposal, as negotiated and accepted by the Government. It is that cost as it appears on the original contract document. Its elements shall contain that cost estimate breakdown by category (i.e., direct labor (Sr. Engineer, Jr. Engineer, draftsman, engineering shop, etc.), burden/overhead, material/parts, travel, subsistence, fringe, General and

(Continued on Page 2)

**11. DISTRIBUTION STATEMENT**

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

Block 7, Application/Interrelationship (Continued)

7.3 It is not intended that all the requirements contained herein should be applied to every contract or program phase. Portions of this DID are subject to deletion tailoring depending on the management requirements of the solicitation/contract in which it is applied.

7.4 This DID is related to DI-A-5016, Project Planning/Actual Progress Chart (Other than fixed price contracts), and DI-FNCL-80003, Man-Hour Expenditure Chart.

7.5 This DID supersedes DI-A-5001B, DI-A-5003F and U-A-5595.

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Block 10. Preparation Instructions (Continued)

Administrative (G & A) fee, outstanding commitments, etc.), as provided in the accepted proposal. Items and amounts specified in this entry shall remain constant on successive reports during the term of the contract.

10.3.1.2 Latest negotiated contract changes. A summary of the latest negotiated contract changes. It shall be a recapitulation of the 10.3.1.1 data elements reflecting all subsequent changes resulting from contract modifications. Breakdown by category shall be as provided in 10.3.1.1 unless altered by a contract modification. Indicate "none" if revised proposals have no effect.

10.3.1.3 Reporting period expenditures. Expenditure data for the current reporting period for the work task categories used in 10.3.1.1 or 10.3.1.2 (as applicable), and covering man hours, funds, and the change (new orders minus fulfilled orders) in outstanding commitments.

10.3.1.4 Cumulative expenditure to date. Cumulative man hour, funds and outstanding commitments expenditure data through the current reporting period for the work task categories used in 10.3.1.1 and 10.3.1.2 (as applicable). Additionally, show the cumulative costs as a percentage of the 10.3.1.1. or 10.3.1.2 costs.

10.3.1.5 Estimated cost-to-complete. The estimated costs required to complete the work task from the reporting date to the date of completion. This estimate shall be defined by categories as they appear in 10.3.1.1 or 10.3.1.2. All estimates shall be justified.

10.3.1.6 Latest cost estimate. An estimate of the final total cost at completion of the work effort. This is derived from 10.3.1.4 and 10.3.1.5. Deviations between the original contract and/or latest negotiated contract change shall be justified/explained in footnote remarks.

10.3.2 Funds expenditure graph. A funds expenditure graph shall be included. The graph shall be reproducible to enable periodic changes reflecting current contract funding status to be entered. The graph shall portray, on a periodic basis, the planned versus actual total dollar expenditures and the percentage of the total contract dollars that the expenditure represents (See Figure 2).

Block 10. Preparation Instructions (Continued)

10.3.3 Work completed graph. A work completed graph shall be included that reflects the percentage of work completed by the contractor through the current reporting period. The graph shall plot actual completion versus planned completion, and shall be maintained current and be fully legible and reproducible (See Figure 3).

DATE PREPARED: ____
CONTRACT NO: ____
CONTRACTOR: ____

**FUNDS AND MAN HOUR EXPENDITURE SUMMARY**

SUMMARY/WORK PACKAGE TITLE: ____
REPORTING PERIOD: ____

| | A | | B | | C | | D | | | E | F |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ORIG. NEGOTIATED CONTRACT | | LATEST NEGOTIATED CONTRACT CHANGES | | REPORTING PERIOD EXPENDITURES | | CUMULATIVE EXPENDITURES TO DATE | | | ESTIMATED COST TO COMPLETE | LATEST COST ESTIMATE (D2 + E)** |
| | A1 | A2 | B1 | B2 | C1 | C2 | D1 | D2 | D3 | | |
| | MAN HOURS | DOLLAR VALUE | MAN HOURS | DOLLAR VALUE | MAN HOURS | DOLLAR VALUE | TOTAL MAN HOURS | DOLLAR VALUE | % DOLLAR VALUE* | | |
| 1. DIRECT LABOR (EMPLOYEE CLASS) | | | | $ | | $ | | | | | |
| TOTAL LABOR | | $ | | $ | | $ | | $ | | $ | $ |
| BURDEN/OVERHEAD | | $ | | $ | | $ | | $ | | $ | $ |
| 2. TOTAL LABOR & BURDEN/OVERHEAD | | $ | | $ | | $ | | $ | | $ | $ |
| 3. MATERIALS & PARTS | | $ | | $ | | $ | | $ | | $ | $ |
| 4. TRAVEL EXPENSES | | $ | | $ | | $ | | $ | | $ | $ |
| 5. OTHER DIRECT COSTS $ | | $ | | $ | | $ | | $ | | $ | $ |
| 6. SUB-TOTAL COSTS $ (SUM OF 2 THROUGH 5) | | $ | | $ | | $ | | $ | | $ | $ |
| 7. GENERAL & ADMINISTRATIVE COSTS | | $ | | $ | | | | $ | | $ – | $ $ |
| 8. TOTAL COST (SUM OF 6 & 7) | | $ | | $ | | $ | | | | $ | $ |
| 9. FEE (OR PROFIT) | | $ | | $ | | $ | | $ | | | $ |
| TOTAL CONTRACT AMOUNT $ (SUM OF 8 & 9) | | $ | | $ | | $ | | $ | | $ | $ |
| OUTSTANDING COMMITMENTS*** | | | | | | $ | | $ | | | $ |
| TOTAL COMMITMENTS AND EXPENDITURES | | | | | | $ | | $ | | | $ |

* THIS FIGURE SHALL BE CALCULATED AS PERCENTAGE OF THE LATEST NEGOTIATED CONTRACT CHANGES, NEGOTIATED CONTRACT, IF ANY, OTHERWISE AS A PERCENTAGE OF THE ORIGINAL NEGOTIATED CONTR.

** THE INCURRENCE OF EXPENDITURES IN EXCESS OF THE CONTRACT AMOUNT REQUIRES APPROPRIATE AUTHORIZATIONS BY THE CONTRACTING OFFICER.

*** UNFILLED PURCHASE ORDERS AT END OF REPORTING PERIOD.

EXAMPLE

NOTE: THIS FIGURE SERVES ONLY AS AN ILLUSTRATION OF THE TYPES OF ENTRIES REQUIRED FOR A FUNDS AND MAN HOURS EXPENDITURE SUMMARY AND PROVIDES A SAMPLE FORMAT.

FIGURE 1. Sample funds and man hour expenditure summary

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# FUNDS EXPENDITURE AND WORK COMPLETED GRAPHS

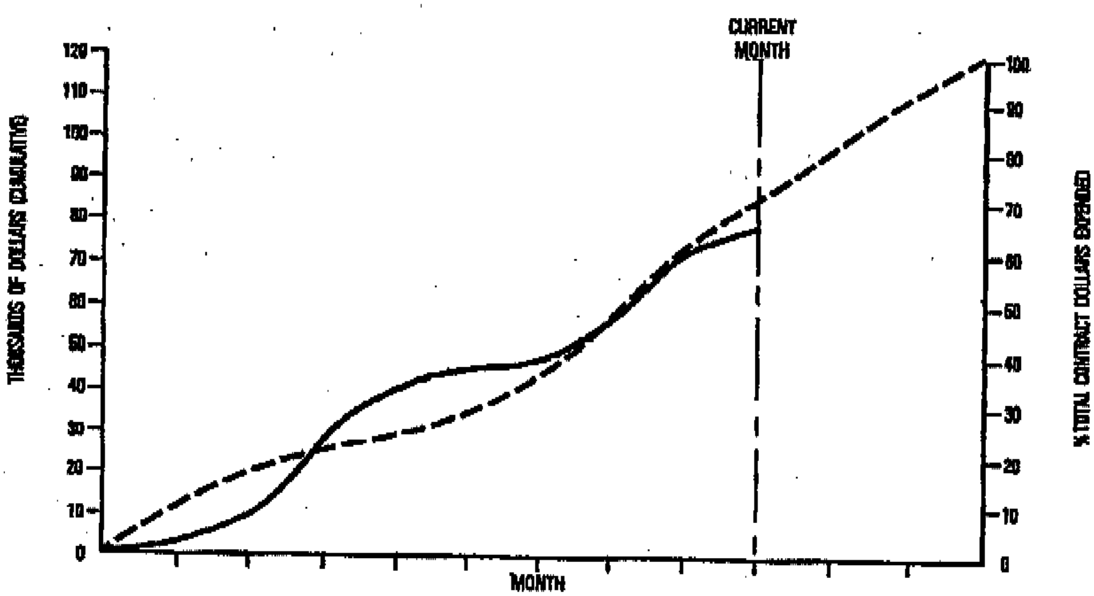


FIGURE 2. Funds expenditure graph

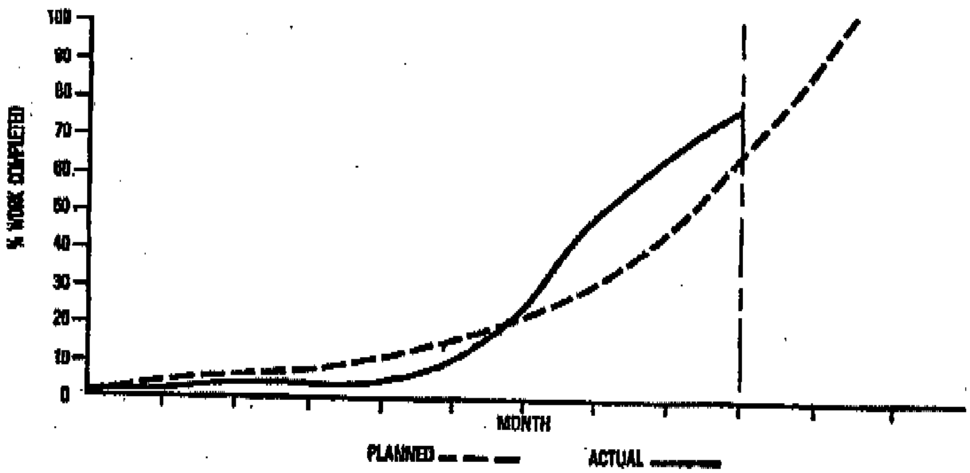


FIGURE 3. Percent work completed graph